

A Path Through the Records – The Ancient Lunar Dome

Part 2 of 5

2026-05-09 Dr. Graeme Innes

The author acknowledges the inspiration of The Other Side of Midnight podcasts with Richard C. Hoagland and the website <https://www.enterprisemission.org>.

In Part 1 of this article, the long standing greyscale impression of the Moon was overturned in favour of a colourful Moon. In Part 2, ways are presented for ordinary citizen-scientists to see for themselves the colours displayed by the ancient lunar dome fragments under special lighting conditions.

Solar Eclipses

There is an alignment several times a year of the Sun, the Earth and the Moon. When these 3 bodies lie in a perfectly straight line, one of two types of eclipse occurs. The one we are interested in here is the solar eclipse, where an observer on Earth sees the dark face of the Moon temporarily cover the bright face of the sun, Fig. 1.

Special eye protection is required to safely view those events, since the observer is looking directly at the blinding light of the sun. Special solar filters are also used to protect sensitive camera equipment attached to a telescope. For additional safety, it is recommended that all but the darkest portion of the spectacle be seen using a camera and viewing screen.

Never use your eye to look directly at the sun through binoculars or a telescope, as these magnify the heat as well as the light and will instantly damage the retina. Instead, project the solar image onto a sheet of paper or light coloured surface.

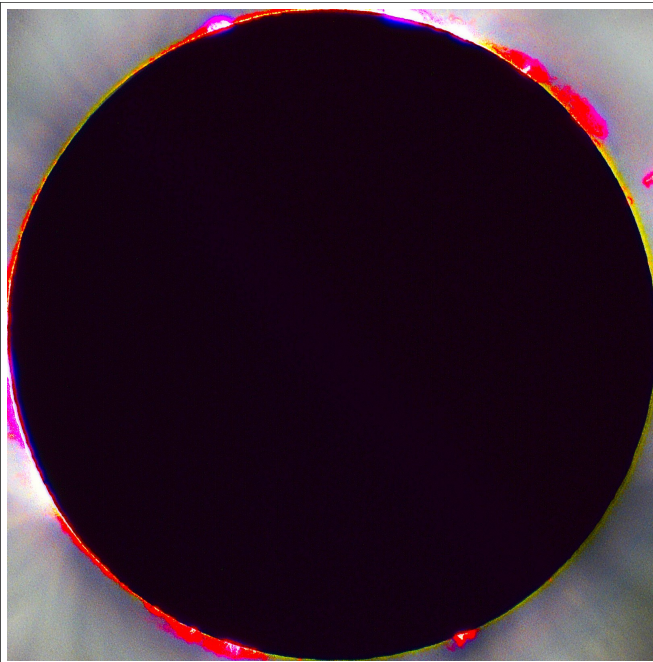


Fig. 1 Solar eclipse of 1999 (credit: Luc Viatour).



Fig. 2 Closeup of solar eclipse coloured ring.

For decades, astronomers have not been able to explain the coloured ring effect around the lunar disc,

especially when the Moon appears larger than the sun behind it. A closeup section of the ring, Fig. 2, shows that it is up to 20 miles (about 30 km) high. This is much taller than the lunar mountains, which are barely visible as the dark ragged edge of the disc.

The sun's light is broad spectrum, meaning it appears white. So what is causing the distinct colours in the ring?

The Vacuum of Space

The same coloured ring can even be seen from the International Space Station (ISS), Fig. 3, projected onto the cloud tops of the Earth below.

Previously, ground based observers have noticed the reddish sky during an eclipse event and mistakenly assumed the coloured light to be some kind of “sunset” effect. After all, a red sky is closely associated with sunrises and sunsets, due to atmospheric refraction and filtering. The light at sunrise/sunset passes through a gas layer up to 10 times thicker than the layer passed through at high noon, which dramatically affects the colour.

But the view from orbit, Fig. 3, shows the area surrounding the Moon's shadow is in broad daylight, well away from the day/night terminator line on Earth. In such a circumstance, atmospheric refraction is simply too weak to notice, which is why mid-day lighting appears blueish compared with sunrise/sunset.

From this consideration and since the ISS and the Moon are both in vacuum (outside Earth's atmosphere), the cause of the colour must be independent of terrestrial weather or related atmospheric effects.

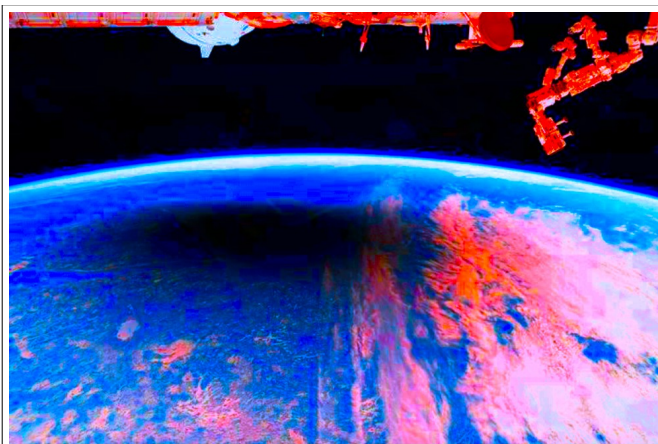


Fig. 3 Eclipse of April 2024 seen from the ISS.

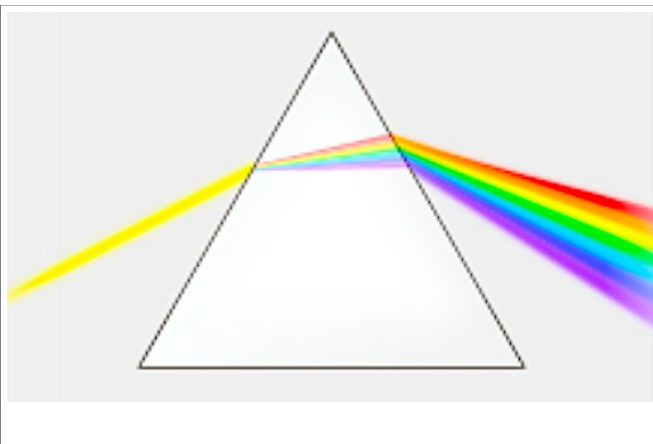


Fig. 4 Refraction of sunlight by a prism.

Refraction Model

From the laws of optical physics, the distinct colours are best explained by the refraction of white light, Fig. 4, which can occur with any transparent material. However, the transparent substances of air and liquid water cannot maintain coherence in a vacuum, and the only ice available in the lunar neighbourhood lies in the permanent deep shadows of polar craters on the Moon.

The last remaining option to explain the eclipse ring colour is the presence of an abundant transparent solid, such as glass – enough glass to project a coloured ring of refracted sunlight, miles in thickness, all the way to Earth during an eclipse.

Given that the solid body casting the shadow during the eclipse is the Moon, a miles-high refracting glass structure must be surrounding the Moon. This points to the strong possibility that there are ruins of an ancient lunar glass dome.

Seeing the Glass Directly

The coloured ring effect only infers the presence of the lunar glass. However, it is possible to see the glass directly with the aid of polarized light.

The concept of polarization is well known to wearers of polarized sunglasses. Depending on the angle of rotation of the lens with respect to the polarization of incoming light, up to about 70 percent of “glare” can be filtered out, allowing a cleaner view of the surroundings. Technically, the glare is largely polarized light and the sunglasses apply a cross-polarization, which darkens the view by rejecting that portion of the incoming light.

With a sensitive camera and digital brightening, blue Earthshine can be seen illuminating the dark face of the Moon during an eclipse, Fig. 5. Earthshine is naturally polarized due to reflection of sunlight from water, ice and clouds. It is most strongly polarized when the Pacific Ocean directly faces the sun and, during an eclipse, is facing the Moon.

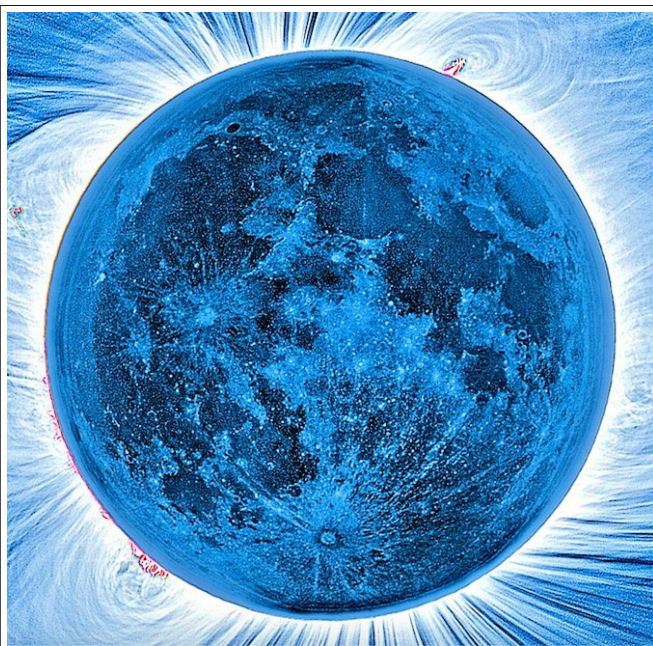


Fig. 5 Solar eclipse of 2008 (credit: Miloslav Druckmüller).

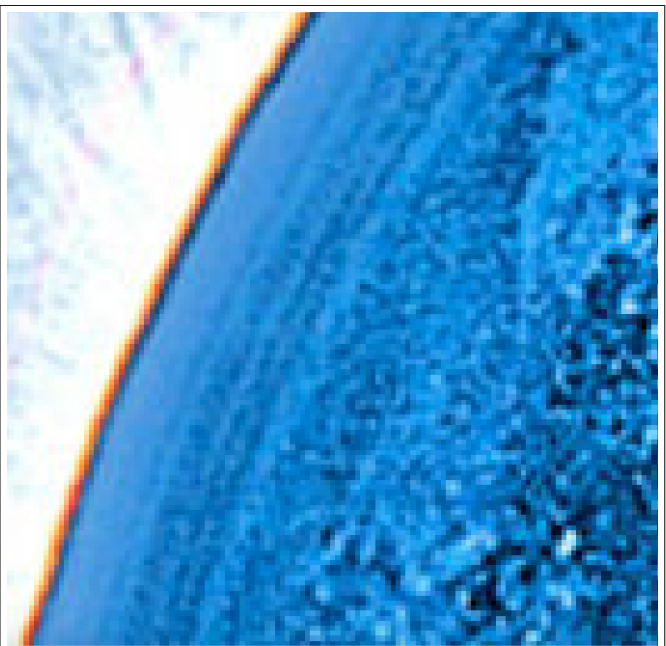


Fig. 6 Closeup view of the lunar rim.

A closeup view of the lunar rim reveals the familiar red coloured eclipse ring, Fig. 6. The lunar rim also shows a series of bands that are concentric with the lunar disc. Where are the craters?

Applying state-of-the-art fractal image sharpening reveals the bands as semi-transparent structures glistening in the polarized Earthlight, Fig. 7. These are the ruins of the ancient lunar glass dome, which

still rise higher than the craters.

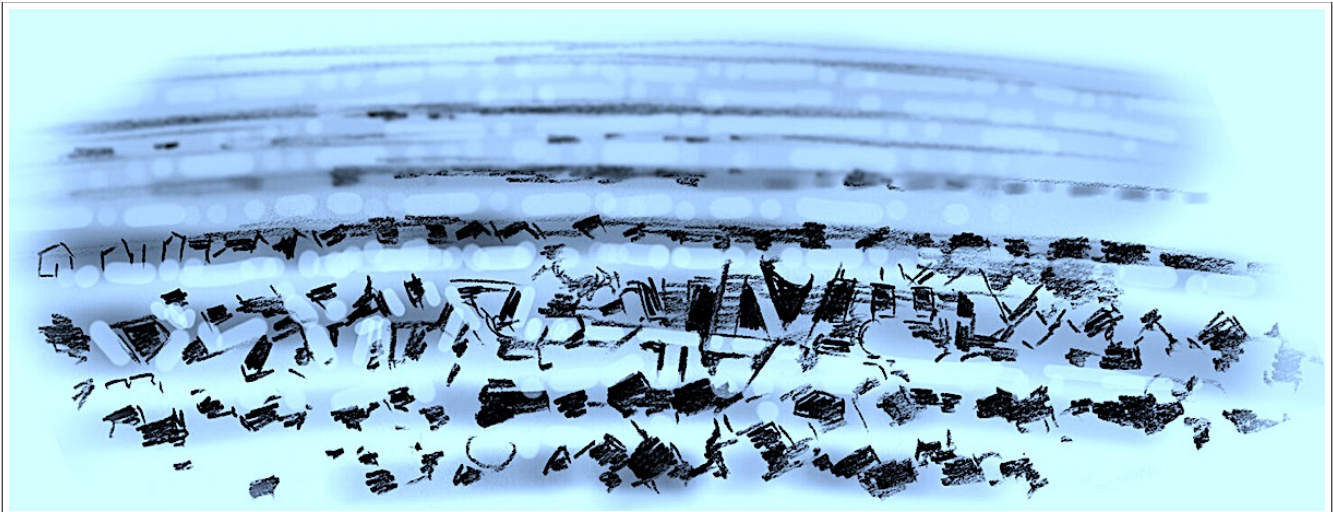


Fig. 7 Sharpened closeup of the lunar rim showing glistening banded structures – the dome ruins.

Science of 56 Degrees

As further evidence that these structures are glass, note that the angle of reflection for glass is 56 degrees away from the surface normal. Beyond that angle, incoming light grazes the glass surface and is reflected, not transmitted through the glass. In addition, light reflected from smooth surfaces such as glass or water causes it to become polarized, which is why polarized sunglasses are able to work.

The banded lunar structures are only seen for grazing angles starting at 56 degrees away from the Earth-Moon direction. From geometry of a sphere of radius r , the latitude of 56 degrees from the surface normal appears as a circle of radius $0.83r = \sin(56^\circ)r$.

Earthshine is transmitted through the glass in the area within that circle, so that the craters are visible as usual. In the annular area outside the circle, light is reflected from the glass. Since the Earthshine is also polarized, the effect is similar to looking through a pair of sunglasses. Due to cross-polarization, the craters near the lunar rim are in darkness beneath the glass, which is what we see in Figs 5 to 7.

In Part 3, find out what the dome looks like in infrared and ultraviolet photographs.

Homework Assignment

Experiment #2:

- Obtain a sensitive camera with telephoto lens, or a telescope with camera, plus tripod.
- Travel to see a total solar eclipse, particularly when the Pacific Ocean is facing the Moon. The polarized blue Earthshine lighting will be strongest under such circumstances.
- Obtain as many high resolution images as possible of the dark face of the Moon.
- Using software, stack the best images into a super-high resolution master image.
- Brighten the master image so the lunar craters under Earthshine are clearly discerned.
- Note the banded structures around the lunar rim. Where are the craters?
- Zoom into the banded structures and do image enhancement. What are those bands?